What is claimed is:

1. An internal combustion (IC) engine for igniting, combusting, and expanding a burnt air-fuel mixture and producing work by mens of a movable piston within a cylinder that has a cylinder head with the combustion chamber located mainly in the head, and further including squish lands for producing high squish-flow and turbulence as the piston nears top center (TC) at the engine compression stroke, the system constructed and arranged to have one or more spark plugs positioned and oriented such that as the piston approaches top center, intense air flow passes through the spark gap to move and spread the spark towards the center of the combustion chamber,

the improvement comprising means for improving the lean burn capability of the engine under light load conditions and the knock rating under high loads by one or more of the following:

a) two spark plugs at or near the edge of a high squish region controlled such that at light loads both plugs are fired, and at high load only one plug is fired;

b) direct fuel injection means wherein intense air-flow interacts with at least part of the injected fuel;

c) direct fuel injection means with air-blast assistance and with at least one spark gap included within the fuel injection means to be subjected to the air-blast;

d) variable compression ratio means, with high compression ratio at light loads and lower compression ratio at high loads.

2. An IC engine system as defined in claim 1 including two spark plugs located at or near high squish regions in the combustion chamber which is of a bathtub shape with large squish lands on the two sides of the length section of the bathtub, and a small squish zone at the far end of the bathtub containing the intake valve, and a smaller or no squish zone at the far end of the bathtub containing the exhaust valve.

3 An IC engine system as defined in claim 2 wherein one spark plug is located in a more central part of the squish edge at a high squish point and the other at a lower squish point nearer to the exhaust valve.

4. An IC engine system as defined in claim 1 or 3 wherein two spark plugs are used and wherein the two plugs have different spark gap widths.

5. An IC engine system as defined in claim 4 wherein the plug nearer the exhaust valve has the smaller spark gap and is fired by itself at high loads, versus both being fired at light load.

6. An IC engine system as defined in claim 1 wherein the fuel introduction means is essentially centrally located fuel injection means.

7. An IC engine system as defined in claim 1 wherein one or more essentially radially outwards fuel injection sprays collide with squish land induced radially inwards squish flow.

8. An IC engine system as defined in claim 7 wherein at least one of one or more spark plugs ar located at the edge of the squish zone with which the fuel injection spray intercts.

9. An IC engine system as defined in claim 6 wherein fuel injection includes air-blast means surrounding the fuel spray.

10. An IC engine system as defined in claim 9 wherein spark gap ignition means is also contained in the air-blast fuel injection means.

11. An IC engine system as defined in claim 10 wherein the air blast entry in above the fuel entry means which is in turn above the spark gap means, defining a three-part system.

12 An IC engine system as defined in claim 11 wherein said three-part system is essentially circularly symmetric.

13. An IC engine system as defined in claim 10 wherein said three-part system is located in the center of the cylinder head of a four valve engine.

14. An IC engine system as defined in claim 1 wherein variable compression ratio means are provided, with high compression ratio at light loads and lower compression ratio at high loads.

15. An IC engine system as defined in claim 14 wherein variable compression means is achieved by having piston top, at the high compression condition, approach as close as practical to the cylinder head without hitting it, defining a very small squish clearance and very high flow, and having the piston further away at low compression ratio.

16. An IC engine system as defined in claim 15 wherein the high compression ratio is approximately 15 to 1.

17. An IC engine system as defined in claim 14 wherein variable compression ratio is achieved by having an "H" annular groove within the piston held by the wrist-pin with annular springs in the top and bottom groove of the "H" groove.

18. An IC engine system as defined in claim 1 wherein variable compression ratio is provided and such variable compression ratio is achieved by having a two part connecting rod with spring means providing the variable compression ratio.

19. An IC engine system as defined in claim 18 wherein said spring means are two annular springs.

20. Method for igniting, combusting, and expanding a burnt air-fuel mixture in an internal combustion (IC) engine and producing work by means of a movable piston within a cylinder that has a cylinder head with the combustion chamber located mainly in the head and fuel introduction and spark means in or adjacent to the combustion chamber, and further including means for producing high squish-flow and turbulence as the piston nears top center (TC) at the engine compression stroke, the system constructed and arranged to have one or more spark plugs positioned and oriented such that as the piston approaches top center, intense air flow passes through the spark gap to move and spread the spark towards the center of the combustion chamber,

the improvement comprising steps for improving the lean burn capability of the engine under light load conditions and the knock rating under high loads by one or more of the following:

a) providing two spark plugs at or near the edge of a high squish region controlled such that at light loads both plugs are fired, and at high load only one plug is fired;

b) directly injecting fuel wherein intense air-flow interacts with at least part of the injected fuel;

c) directly injecting fuel with air-blast assistance and providing at least one spark within the injected fuel to be subjected to the air-blast; and

d) varying compression ratio with high compression ratio at light loads and lower compression ratio at high loads.